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Making Magic Machines

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Abstract

It is becoming increasingly common to include design methodology into innovation processes, but this is still mostly done to problem-solve or user-test technologies that are already at a late stage of innovation. This paper describes an attempt to use a fine art sculptural process to access unspoken desires and fears of the new and unknown: an exploratory children's workshops aimed at uncovering new technological objects and needs using craft and embodied making. The workshop uses the notion of *magic* and *machine* as substitute for *technology* to allow a broader range of response. We ask questions like: How do we design magic? What is magical to you? If you could make anything at all, what would it be? The responses are low-fi objects built from paper, cardboard, wood, string and plastic. These objects are in turn treated as props in a process of enacting a future scenario-of-use. The paper describes the process itself as well as a small selection of the resulting objects and suggests some tentative guidelines for using this type of workshop format.

KEYWORDS: Machine, magic, children, innovation.

Introduction

User research is traditionally conducted to allow end-users of a product to influence and guide its development and design. The *Magic Machine* workshop described in this paper sets its aim much earlier in an innovation process to attempt to engage people in a conversation about their technological desires and needs. As such the workshops are an attempt to facilitate a lived experience of engaging directly with an essentially imaginary future object.

These types of experiences are anchored in design research methods such as Placebo Designs (Dunne and Raby 2002), Future Technology Workshops (Vavoula et al 2002), and Cultural

Probes (Gaver et al 1999) who all lean heavily on repurposed methods from the social sciences. This carries some risk as Dourish points out: 'ethnography is not only "about" the culture under study, but equally, implicitly or explicitly, "about" the cultural perspective from which it is written and that of the audience to whom it is presented. Clifford Geertz famously described culture – the object of anthropological ethnographic inquiry – as "stories that people tell themselves about themselves," and, by the same token, by telling an ethnographic story about some Other, the ethnographer also tells a story about ourselves' (Dourish, 2006). I would like to propose that by introducing crafting and sculptural methods into these workshop processes we can make active use of this ethnographical fault line, by creating new cultural objects and then allowing them to act as prompts for a *story we tell about ourselves*.

The specific workshop addressed in this paper was conducted with children but forms part of a larger body of work that aims to allow people of all ages to engage with the crafting of the new and unknown using artistic methods. This includes longstanding collaborations with Danielle Wilde focusing on body-worn devices (Andersen and Wilde 2012), with Audrey Samson focusing on imagining scenarios for specific technologies (Samson and Andersen 2013) as well as ongoing workshops on creating new instruments and interfaces conducted with both professional musicians and children at STEIM, Amsterdam (Andersen 2013). Each of these formats take the form of experimental workshops that test the link between investigative objects and the meaning that may reside as potential in and around them.

Oppenheimer famously described scientists as 'living always at the "edge of mystery" - the boundary of the unknown' and Rebecca Solnit echoes this sentiment in *A Field Guide to Getting Lost*: 'scientists transform the unknown into the known, haul it in like fishermen; artist get you out into that dark sea' (Solnit 2005). These workshops can be said to be conducted on those dark seas.

Aim

The *Magic Machine* workshop discussed in this paper was executed with a group of children between 4 and 8 years old. The overall aim was to test if it is possible to encourage the sharing of technological desires and needs through the proposing and making of low-fi objects. As such the workshop format is speculative and open-ended and while we are working towards a greater understanding of the possibilities of thinking about and making new technology, we are not aiming at a particular design or set of requirements. By playing on the threshold between the everyday and the unexpected we find ourselves in a make-believe situation where we can explore and investigate the making of prototypes and attempt to generate insights into the process itself.

Making and making strange

Making can be seen as a sculptural process of allowing objects to be formed in your hands. Making something relies on fully embodied participation; it transcends language and instead relies on motorics and time, skills and knowledge. As an object slowly takes form, we can begin to develop intuitions about its capabilities and behavior. (Andersen 2005) How these intuitions are expressed and supported into narratives of use is central to the imagination of the strange and the new. This is not just encouraging the willing suspension of disbelief but attempting to engage subjects in the active re-imagination and re-making of the world. To facilitate this, we can draw inspiration from the notions of *magical thinking* and *making strange*.

Magical thinking can be described as basic misinterpretation of the causal relationships between emotions and desires, word and actions, and finally objects and people. When we encounter an unknown object we are open to its capabilities and prone to misunderstand not only how it works, but also what it does. According to Frazer this depends on two laws: The law of similarity where the effect resembles its cause and the law of contagion, where things, which were once in physical contact, maintain a connection even after physical contact has been broken. The basic premise is that *like affects like*, or that one can impart characteristics of one similar object to another (Frazer 1906-1915). If an unknown object acts or looks like a known one, it may have similar characteristics or even carry some of the original objects' *essence*. The latter being the type of magic associated with voodoo dolls. Even if the magical object does not actually look like the target, it has been *contaminated* with the target through physical contact of some kind and it maintains this connection and through that some element of influence or power.

Malinowski discusses a type of magical thinking in which words and sounds are thought to have the ability to directly affect the world. This refers directly to concepts of *true names*, curses, prayers and magical spells (Malinowski 1960). In a sense many of our traditional rituals like marriage depend on this kind of logic. To declare something, under particular circumstances, makes it true. 'I do.' This leaves the most commonly understood version of magical thinking. In psychology children are often described as making direct connections between their inner states and the outside world. 'It is raining because I am sad' (Glucklich 1997). This type of thinking in adults, is of course linked to delusion and paranoid tendencies. Holmquist makes the case that certain design practices actively create *cargo cults* - elaborate instances of magical thinking (Holmquist 2005).

This project deliberately engages users in these types of misunderstandings in order to facilitate new, out of the ordinary, interpretations of objects. The actual process of investigating them leans directly on the technique of *making strange*. *Making strange* or defamiliarisation is the artistic technique of forcing the audience to see common things in an unfamiliar or strange way in order to enhance perception of the familiar (Shklovsky 1917). It is a central concept to both Surrealism and Dada, centered on the idea that the act of experiencing something occurs in the moment of perception and that the further you confuse or otherwise prolong that moment of arriving at an understanding of an object of art, the deeper or more detailed that understanding will be.



Figure 1. Choosing your box

Workshop setup

A group of children arrive in a neutral, utilitarian space, containing tools, paint and various neatly organized recycled materials. The materials are chosen to afford a large range of structural possibilities and aesthetics. In the middle of the room lies a large collection of cardboard boxes of various sizes (figure 1). The facilitator asks the children to pick any box that takes their fancy and gathers everyone into a large circle. This is the beginning of a group conversation about magic and machines: What is magical to you? If you could have any skill at all, what would it be? Have you ever built a machine? Would you like to? The facilitator has picked a box for herself and muses out loud about what kind of machine she imagines the box could become. Now each child is asked to describe and elaborate on the spot about the machine that their box will turn into. This introduction process takes about 15 minutes and the group then moves on to building the machines out of their boxes and the other materials in the room. The workshops described in this paper were conducted at the Transmediale festival in Berlin with a group of 16 children.

Background

The choice of working with 4 to 8 year old children is guided in part by the openness of our question. The main component of the workshop is the notion of *play-acting the future*. Lillard describes children's pretend play as an area of advanced understanding with reference to three skills that are implicated in both pretend play and a theory of mind: the ability to represent one object as two things at once, the ability to see one object as representing another, and the ability to represent mental representations (Lillard 1993). The workshop format leans heavily on this notion of pretend play as practicing at seeing the object at hand as both what it is (a cardboard

box) and what it isn't (a magic machine). In a more practical sense it was decided in conversation with the festival organisers that the age group 4-8 was the youngest group we felt we could trust with tools such as glue guns and real scissors.

Language

The conceptual setup allows us to introduce the notion of new and unknown, solely through the use of the words *magic* and *machine*. This approach is similar to that of Auger and Loizeau in their analysis of *the robot* as a societal and cultural reflection on our dreams and aspirations: 'The robot can reflect the current state of technological development, our hopes for that technology and also our fears; fundamentally though after almost a century of media depictions and public demonstrations, the robot is yet to enter our homes and lives in any meaningful way.' (Auger and Loizeau 2011) By substituting the word *technology* with *magic* and *machine* we are opening up the query to reach beyond the adjacent possible to our current technologies, with *magic* referring strongly back to the well known definition by Arthur C. Clarke: 'Any sufficiently advanced technology is indistinguishable from magic' (Clarke 1984). *Magic* in this context refers to the desired not-yet-understood ability of future technology and *machine* to its embodiment and physical interface to the human user.

The workshop as a game

Caillois specifies a number of characteristics for games: they are engaged in by choice; they are separate from the routine of life and occupy their own time and space; games are uncertain: the results cannot be predetermined, the players' initiative is therefore required; games are unproductive: they create no wealth and end as they begin; games are governed by strict rules that suspend everyday laws and behaviors; and, finally, they involve make-believe that confirms in players the existence of imagined realities that may be set against 'real life' (Caillois 2001). The workshop is designed to conform to this definition by being voluntary (not conducted in a school setting) and out of the ordinary (a one-off experience at an art gallery). The outcomes are uncertain and unproductive. The format is held up by a series of strict rules: You must start with a box, you are confined to the materials at hand, the workshop ends at a set time. In general all making and crafting can be said to be a form of play as long as one keeps in mind that playing a game is not necessarily light-hearted or fun; but rather a way of approaching a particular design space and a set of rules and limitations (Andersen 2007).

Building as a process of thinking

Workshop formats like this essentially postulate that embodied making processes facilitate a different form of thinking. As an object slowly takes form on the table in front of us, we can begin to develop intuitions about its capabilities and behavior. In that sense the building process is a dialogue between, on the one hand, the intentions of the maker and the limitations of the material and, on the other hand, the object itself as each modification opens up new possibilities

for the ongoing building process. Maybe in an extrapolation of Hayes' *naive physics* (Hayes 1978) we could say that it is through the actual making that we begin to comprehend the objects we are building. Dr. Montessori of course famously used blindfolds in reviewing materials, stating that the eye can interfere with what the hand knows (Lillard 2008) and the idea of representing and developing thoughts and ideas through the manipulation of physical objects has had a strong place in education since Froebel's early ideas of the kindergarden (Brosterman 1997).

Results

To illustrate the type of work conducted at the workshop we will now describe three magic machines.



Figure 2. Painting the translator

"The translator" created by A, 5 years old

The translator (figure 2) is built from a small low box and a water bottle. It translates between Russian and Greek but has a very specific narrative of use. The water bottle is the active device, residing in the elaborately decorated box when it is not in use: its only functionality is to sing a lullaby in either Greek or Russian. It comes out of the box through one of two doors and the choice of door determines in which language the water bottle will be singing. You sing a song to it and put it back in the box, and when you retrieve it, it will have translated the song to one of the two languages. The child is very determined that no other languages will be available and that spoken language cannot be translated. In that sense the machine is strictly a device for mediating between two song cultures. A, herself is trilingual, living in Germany with a Greek mother and a Russian father.



Figure 3. The large door of the scale machine

"The scale machine" created by B, 8 years old

The scale machine (figure 2) is built from a large box using very few additional elements. It features two doors on either side of the box, both are circular, one is small (about 10 cm in diameter) and the other large (about 40 cm in diameter). The box is decorated with a series of horizontal white stripes that suggest a spiral enveloping the box. The scale machine can make things larger or smaller. It works in a very simple manner: If you put an object into the machine through the large door, walk around the box and retrieve it through the small door the object will have shrunk by a factor of about 3. Likewise objects delivered through the small door and removed through the large door will have grown in a similar way. The machine has no other features or functionalities. B is very excited about her machine and goes to great lengths to make sure that it will make it back to her home intact.

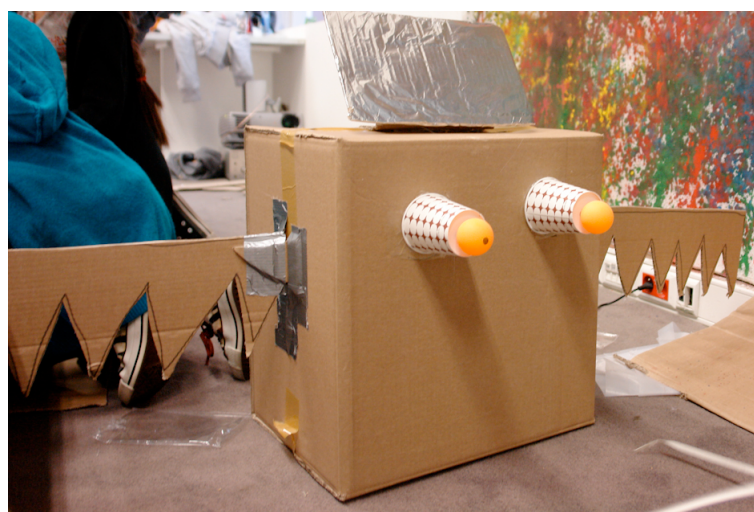


Figure 4. Front of the nature defender

"The nature defender" created by C, 6 years old

The nature defender is based on a medium sized square box. It is outfitted with wings, small wheels and a silver foil covered antenna. The initial conversation with C starts with her declaration that she will build a robot that defends nature. The facilitator asks if it will monitor pollution or in other ways protect the environment, but C is appalled by these suggestions. Instead, the Nature Defender is on the lookout for people being evil to dogs. When it determines that such a situation is at hand, it does not do anything drastic but rather rolls up to the offender and politely asks him or her to 'stop doing that'. Most of the features of the machine are designed to make it easier for it to get around and listen for dogs in distress.

Outcomes

In all these cases the children have very strong ideas about the intended use of their machines. The facilitator asks questions only to help them understand their ideas better and is otherwise limited to helping out with the actual construction of the machines. Anecdotally, three distinct patterns emerge at these workshops. Some children latch onto an idea during the initial Q and A session and simply set out to build it changing very little of the functionality of the initial idea; others start out with a vague desire (e.g., protecting the environment) and slowly develop the idea throughout the building process. The third group simply begins building and through that process the concept of the machine emerges. The Scale Machine is an example of this: the first round door was simply deemed too small and a bigger one was cut in the other side of the box to replace it. Only then did the idea of scaling crystallize out and the rest of the building process focused on executing this new idea.

It would be too bold to think of these machines as results in any formal way and indeed they cannot be quantified and analyzed as such. Instead they should be viewed as tentative objects that address an otherwise hard to access emotional space. It is hard to come up with ideas and things that do not already exist. What will the future bring? How could life be different? Meno, the eternal straw man, asks Plato: 'How will you go about finding that thing the nature of which is totally unknown to you?' (Solnit 2005) These machines show at least a willingness to engage with such a question and the potential of using embodied making as a way to develop and query even the most tentative of ideas.

Working with children is different from the workshops we do with teenagers and adults. Young children are obviously well suited to feats of imagination and magical thinking, but they also have a more difficult time verbalizing their thoughts, especially when it concerns abstract concepts and actions (Piaget quoted by Druin 2002). Instead they often choose to act out their emotions and hunches, storytelling their ideas as narratives rather than concepts. As a result we rarely gather the expected scenarios-of-use and are instead presented with props for 1st person narratives. This is in contrast to working with adults where the challenge is to initiate and maintain an open

creative process, holding back conceptual sense making until the end of the workshop. See Andersen and Wilde (2012) for concrete examples of design guidelines for this.

Suggested guidelines

A number of guidelines specific to working with this age group suggest themselves. They primarily concern the role of the facilitator the choice of materials and making processes and the words used to seed the making/thinking process.

The role of the facilitator

The main function of the facilitator is to ‘take responsibility for the moment’. The questions we ask are essentially both silly and hard to answer. In order for the participants to be able to enter into such a space in good faith, the facilitator must embody the strict rules that suspend the laws and behaviors of the world outside. In that way the facilitator can create an alternative playful space in which these questions can be not only answered but build and explained in detail.

The Choice of Materials and Scale

To use the cardboard boxes as a starting point for the machine is very helpful in terms of ensuring that the magical idea immediately can become both physical and buildable. It is also important that the materials range in scale from bottle caps to boxes big enough to hide in. To fully benefit from the physical exploration of the ideas, all sorts of embodied experiences must be supported in the building process. Cardboard boxes are perfect for this as they are both sturdy and easy to modify. The building process itself allows the exact functions of the machine to be worked out in detail as the building process proceeds. By starting the workshop process with the choice of a box and then, while holding the box, explaining what you intend to build, we ensure that the idea is not only expressed in the object, but in a sense can be seen to be prompted by or even originating in it.

The Choice of Words

The use of *magic* and *machine* to substitute *technology* has been successful in allowing the resulting objects to be anchored in desires like protection, communication and control, while still allowing them to be very physical and specific in both their functionality and design. This suggests that it is worthwhile to look very carefully at the terms being used in these types of experiments. Will the use of certain terms limit or expand the range of responses we see?

Concluding thoughts

The *Magic Machine* workshop differs from Placebo Designs, Future Technology Workshops and Cultural Probes in that they do not take their origin in a specific problem (Placebo Designs), use-case (Future Technology Workshops) or cultural context (Cultural Probes). In many ways the *Magic Machine* can be seen as a first sketch for yet another probe, but one that aims at the totally unknown and attempts to address the underlying emotional context of that unknown realm.

The children taking part in the workshop were all deeply engaged with our questions through building sculptural and embodied future machines. Instead of delivering technology concepts they told us stories that sit somewhere between fairytales and science fiction. The format successfully supported the use of physical making as a way of allowing them to think with their hands and then let the resulting object support the imagining and talking about that, which is yet to be fully understood or even imagined.

After conducting this workshop the challenge remains to find non-intrusive ways to document and capture these often very fragile moments. Interviews, observations and artifacts are obvious places to start but we would like to move towards a place where the documentation process becomes an intrinsic part of the experience itself and the participants may move on to become co-authors of the data gathered rather than objects for observation. It is important to note that we see every workshop is a live and volatile process, understood in the sense of Dewey's *experience* (Dewey 1958) where we work with ideas not just in the form of description, where only language can become knowledge and meaning but rather as a *process of becoming* that without turning to either romanticism or mysticism can allow what may appear as chaos to create order and pattern through embodied experiences (Andersen and Wilde 2012).

This type of workshop experience can be the beginning of opening up a larger ongoing conversation about our fears and hopes for the future with broader groups of participants. By actively imagining our own future, we may be able to reclaim the notion of innovation from technologists and markets. Through this *practicing at* the future we have the chance to develop our ethics and cultural responses to the new and the unknown.

To do this we must again cast out to the dark sea Solnit describes in the *Introduction* with nothing but Wyndham Lewis' blessing: 'Bless all seafarers. They exchange not one land for another, but one element for another. The more against the less abstract.' (Lewis 2000)

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